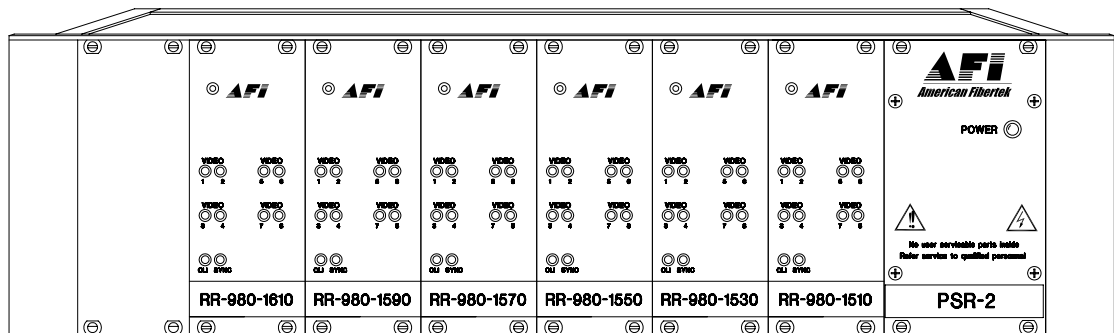
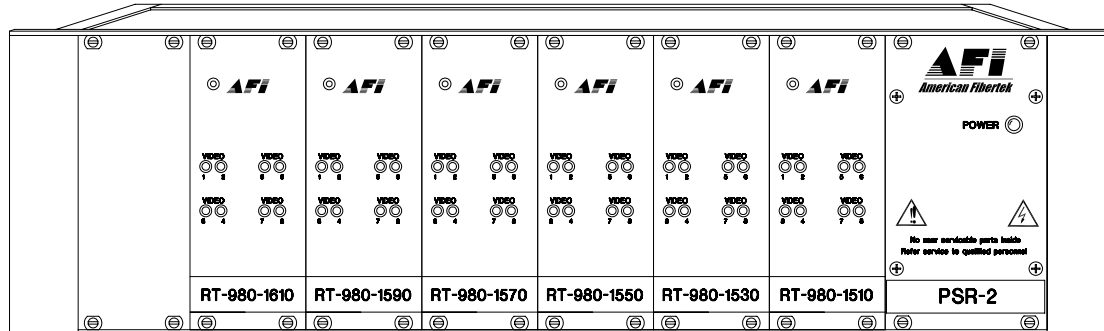




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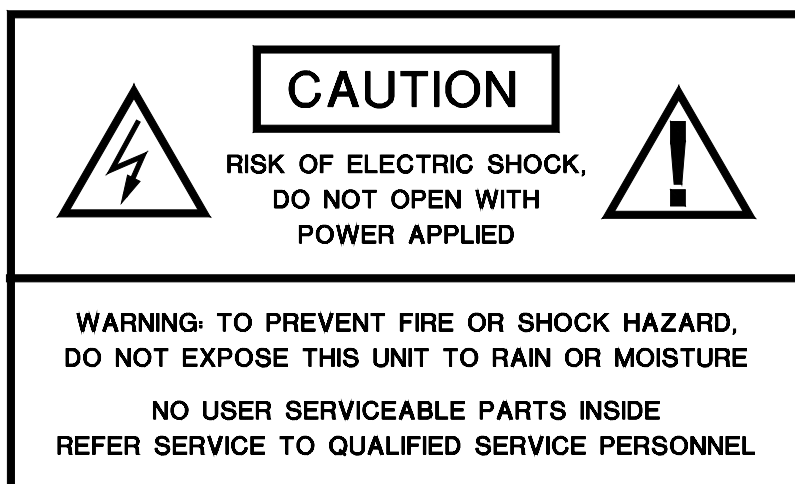


## Instruction Manual

RT-94885SL

RR-94885SL

Forty-Eight Channel Video Multiplexer  
With Two Bi-directional Data Channels



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## INSTALLATION AND OPERATION INSTRUCTIONS

### INTRODUCTION

Thank you for purchasing your American Fibertek Series 94885SL singlemode forty-eight channel video multiplexer with bi-directional multi-protocol data. Please take a few minutes to read these installation instructions in order to obtain the maximum performance from this product.

### FUNCTIONAL DESCRIPTION

The 94885SL Series units operate as a transmitter / receiver pair for the digital transmission of forty-eight simultaneous NTSC or PAL video signals along with two channels of field configurable bi-directional data over one singlemode fiber optic cable. These data channels may be configured as RS485 data, RS422 data, RS232 data, or Manchester data. The RS485 channel may be configured for 2-wire (half duplex) or 4-wire (full duplex) with or without biasing. Switch selectable internal 120 ohm terminations are available for RS422 or RS485 data.

**NOTE: This unit is shipped with Data Channel 1 and Data Channel 2 in the RS485 4-wire configuration. For other configurations, please refer to the DATA MODE section for changes to the default switch settings.**

**NOTE: This unit is shipped with data terminations off and data bias off for Data Channel 1 and Data Channel 2. For other configurations, please refer to the DATA TERMINATION / BIAS section for changes to the default switch settings.**

The RT-94885SL transmitter accepts up to forty-eight video inputs in six groups containing eight videos and multiplexes each group into a high speed serial data stream. The first group's serial data stream modulates a laser at 1510nm wavelength. The second group's serial data stream modulates a laser at 1530nm wavelength. This pattern is repeated for group's three through six using wavelengths 1550nm through 1610nm respectively. A Course Wave Division Multiplexer (CWDM) combines these six wavelengths, along with the forward data wavelength of 1490nm and the return data wavelength of 1470nm, onto a single optical output port for connection to the fiber transmission system. Correspondingly, the RR-94885SL receiver converts the optical signal to forty-eight independent video output signals and two forward data channels while transmitting the two return data channels.

The 94885SL Series product is designed to operate over an optical loss budget range of 0dB to 21dB on 9um singlemode fiber. Refer to the product specification sheet for additional performance data.

## INSTALLATION

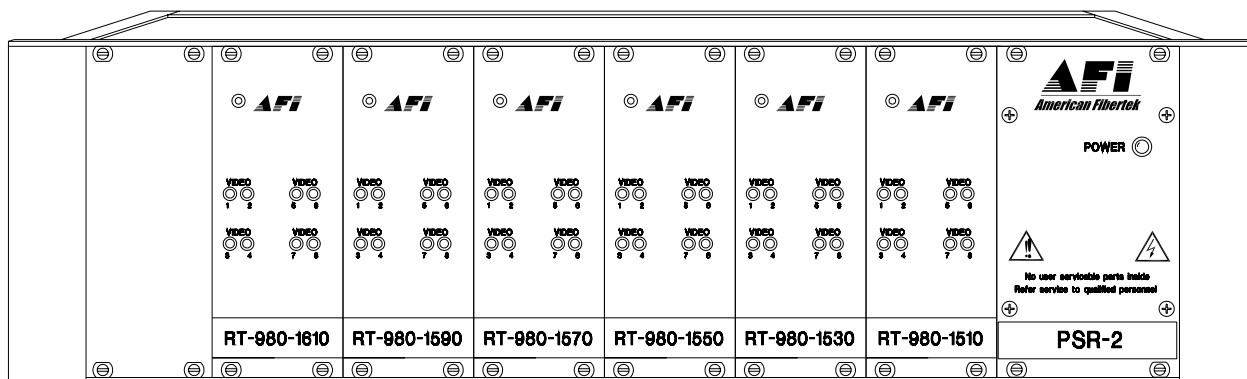
THIS INSTALLATION SHOULD BE MADE BY A QUALIFIED SERVICE PERSON AND SHOULD CONFORM TO THE NATIONAL ELECTRICAL CODE, ANSI/NFPA 70 AND LOCAL CODES.

## RT-94885SL COMPONENTS

The RT-94885SL consists of the following components:

1) RT-980-1510	1) RT-980-1570	1) SR-20	1) PSR-2
1) RT-980-1530	1) RT-980-1590	6) PCSC/UPC-0.3	1) BPS-2
1) RT-980-1550	1) RT-980-1610	1) MTX-CWDM-8-MPD	

The individual 980 series video rack cards that make up the RT-94885SL are combined in a rack mount configuration using the SR-20 subrack. Please refer to the instruction manuals for the SR-20 and the PSR-2 for information on the installation of the subrack with its power supply. The individual 980 series rack cards can slide into any of the open slots in the SR-20 subrack, however, the recommended configuration is shown below. This configuration starts with the lowest wavelength card, the RT-980-1510, next to the PSR-2 power supply and ends with the highest wavelength card, the RT-980-1610, at the left side of the rack. Following this configuration allows the fiber port on the back of the 980 series card to best line up with its associated port on the CDWM unit. Use a small screwdriver to push and lock the ¼ turn fasteners into place. The Multi-Channel Digital Video CWDM that optically multiplexes the six video rack cards used in the RT-94885SL is labeled MTX-CWDM-8-MPD. It should be mounted directly below its corresponding SR-20 subrack with a ½ RU space between the two components. To maximize the performance and life of the system, installing a fan above the SR-20 subrack is recommended to pull air up across the RT-94885SL components.



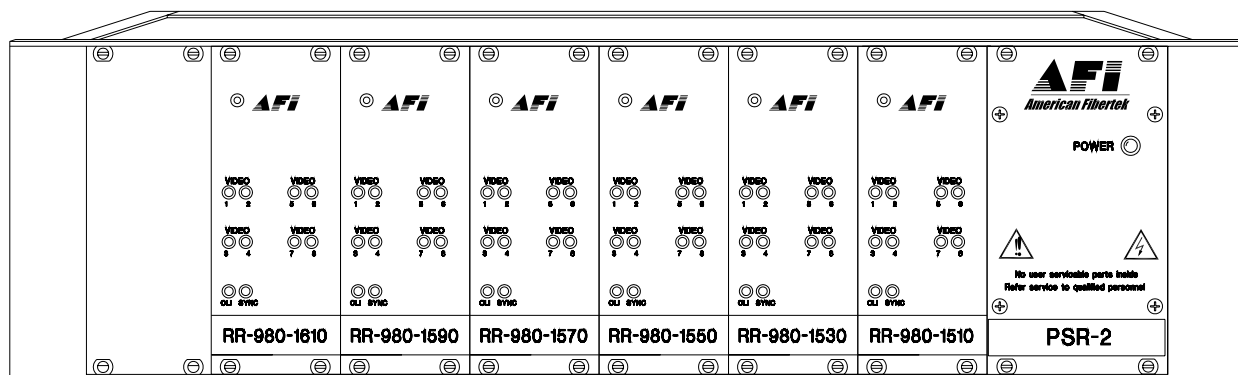
## RT-94885SL

## RR-94885SL COMPONENTS

The RR-94885SL consists of the following components:

1) RR-980-1510	1) RR-980-1570	1) SR-20	1) PSR-2
1) RR-980-1530	1) RR-980-1590	6) PCSC/UPC-0.3	1) BPS-2
1) RR-980-1550	1) RR-980-1610	1) MRX-CWDM-8-MPD	

The individual 980 series video rack cards that make up the RR-94885SL are installed in a manner similar to the RT-94885SL (see drawing below). The Multi-Channel Digital Video CWDM that optically demultiplexes the six video rack cards used in the RR-94885SL is labeled MRX-CWDM-8-MPD. Mounting procedures and recommendations should follow those used for the RT-94885SL.



## RR-94885SL

### POWER SOURCE

Power to the 980 series rack cards is supplied by the subrack. Please refer to the SR-20 and PSR-2 instructions for further details.

Power for the CWDM units is generated by an internal power supply which accepts universal line voltage. Any mains supply from 100 to 240 VAC, 50 to 60 Hz, may be used without modification or adjustment. A universal power connector is provided on the rear of the unit to facilitate connection to the power mains.

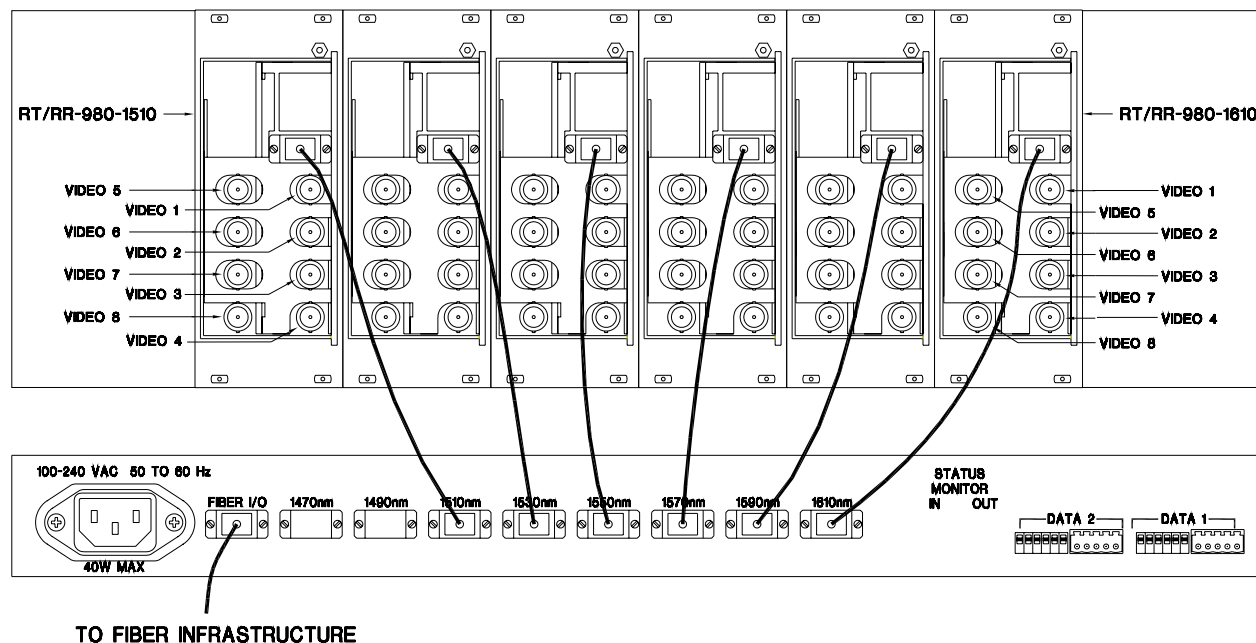
### POWER CONNECTION

Power is supplied to the individual 980 series units via a four finger backplane connector. The individual components can be inserted into the subrack or removed from the subrack with power applied to the backplane. Please refer to the SR-20 and PSR-2 instructions for details.

The CDWM unit is supplied (in the US and UK only) with a three conductor power cord. The "ground" conductor is directly connected to the chassis.

## FIBER CONNECTIONS

The fiber optic connection to the user's infrastructure is made via a SC connector located at the back of the CDWM unit next to the power input. Be sure to allow sufficient room for the required minimum bend radius of the fiber cable used. SC patchcords are supplied for the intra-fiber connections between the CWDM and each of the 980 series units. The wavelength listed for each port on the CWDM must correlate with the wavelength listed on the 980 series unit to which that port is attached.



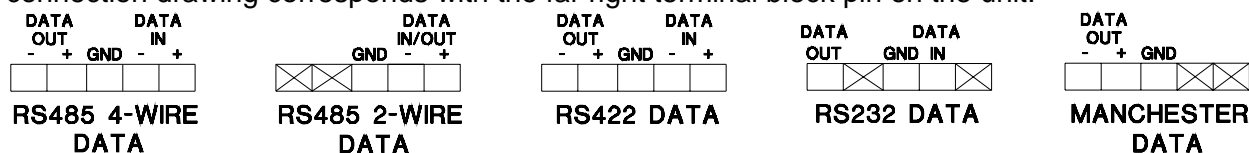
## VIDEO INPUT / OUTPUT CONNECTIONS

Video input and output connections are located on the rear of the 980 series units. A BNC connector is provided for each channel. The video inputs are connected to an appropriate 75Ω baseband video source such as a camera or a video recorder output. The 75Ω video outputs can be looped through typical baseband video inputs of switchers, recorders and other equipment as required. For proper operation, the outputs must be terminated with 75Ω. For optimum performance the video cables should be the shortest length of coax practical.

The location of a video input to the RT-94885SL will be mirrored as a video output at the RR-94885SL. For example, the Channel 2 video input on the RT-980-1550 will become the Channel 2 video output on the RR-980-1550 after traveling across the fiber infrastructure.

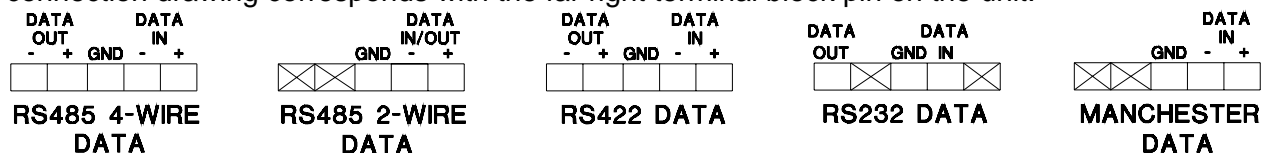
## RT-94885SL DATA INPUT / OUTPUT CONNECTIONS

Data input and output connections are made via terminal blocks on the back of the MTX-CDWM-8-MPD unit. See the drawings below for proper orientation of the input and output connections for each of the two data channels. Please note that the far right pin on each connection drawing corresponds with the far right terminal block pin on the unit.



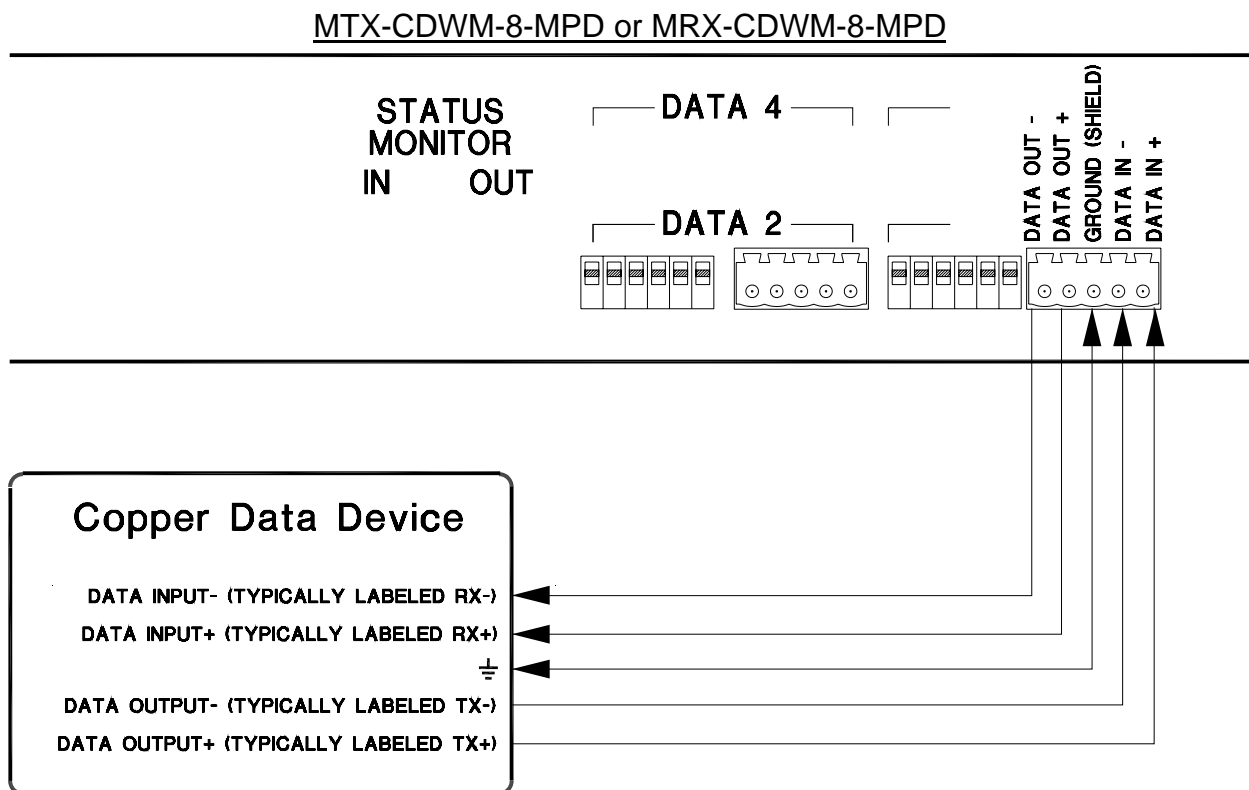
## RR-94885SL DATA INPUT / OUTPUT CONNECTIONS

Data input and output connections are made via terminal blocks on the back of the MRX-CDWM-8-MPD unit. See the drawings below for proper orientation of the input and output connections for each of the two data channels. Please note that the far right pin on each connection drawing corresponds with the far right terminal block pin on the unit.



## TYPICAL SYSTEM DATA CONNECTIONS

An example of the RS422 or RS485 four wire interconnection between the 94885SL series unit and the copper device to which it is attached is shown below. This illustration is based on industry standard EIA terminology for the transmission of electronic data signals. Using this terminology, the driver of an electronic signal is labeled TX or data out. Correspondingly, the receiver of an electronic signal is labeled RX or data in. Not all manufactures follow standard EIA terminology. Consult the installation instructions for your copper device if you are unsure which two wires are the drive (data out) wires and which two wires are the receive (data in) wires.

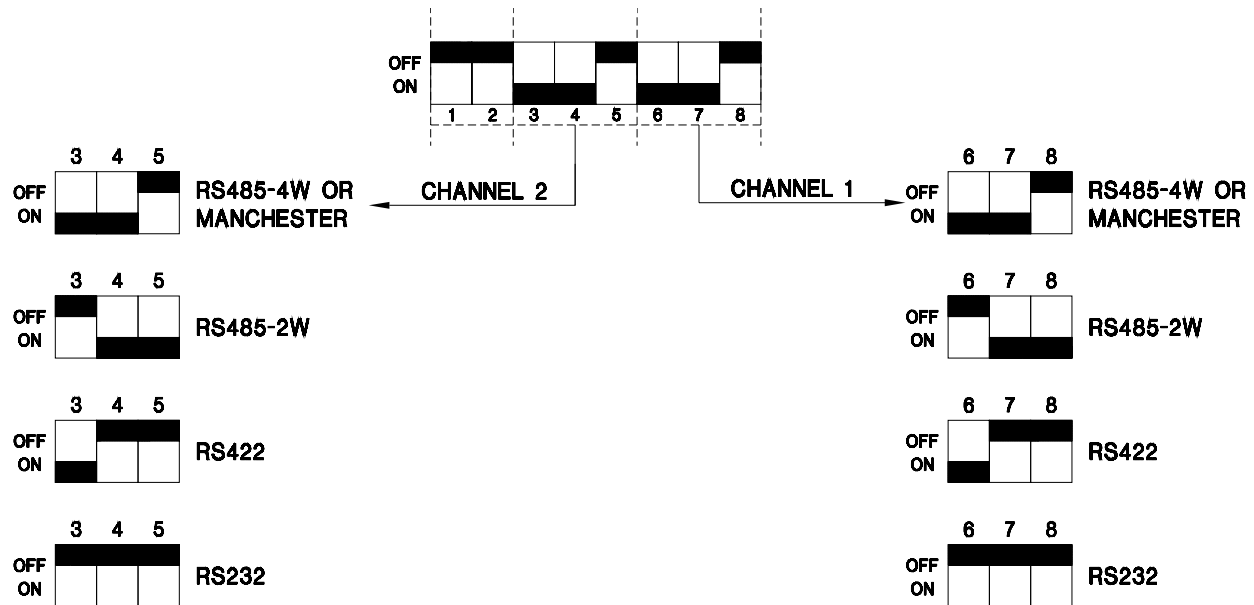


Please note that Data In on the RT-94885SL becomes Data Out on the RR-94885SL after going across the fiber. The reverse flow follows the same orientation.

## DATA MODE

**NOTE:** This unit shipped with Data Mode switches in the RS485 4-wire position.

For other configurations of data channel 1 or data channel 2, please refer to the drawing below for changes to the default switch settings. These configuration switches are located on the front of the unit and can be modified without opening the unit. Please note that switch # 1 and switch # 2 are not used and should remain in the off (up) position.

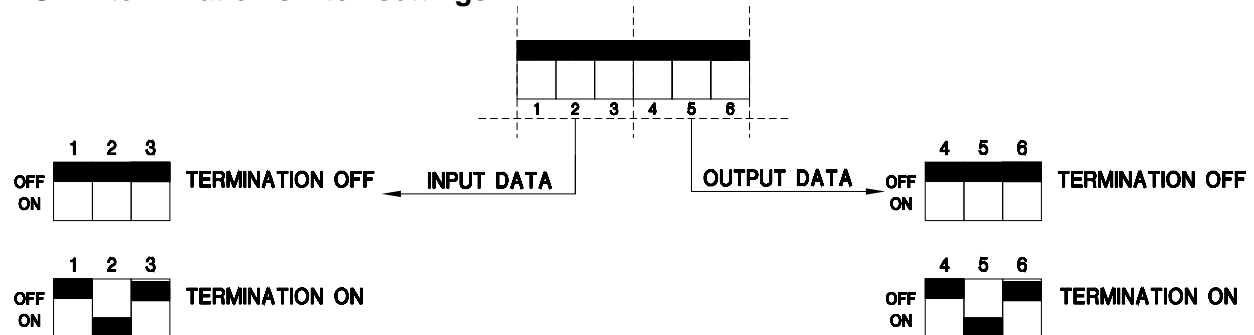


## DATA TERMINATION / BIAS

**NOTE:** This unit is shipped with Data Termination and Bias switches in the off position.

Switches are available on the back of the unit next to the data connections that allow offset bias and termination features to be activated. In a majority of cases, bias will not be required and these switches should remain in the up position. For an explanation of RS485 biasing please refer to the OFFSET BIAS – RS485 section. Use of bias and termination switches varies for each data format. Please refer to the drawings below and on the next page for the possible switch settings for each format. **When transmitting RS232 or Manchester data, the bias and termination switches must remain in the off (up) position.**

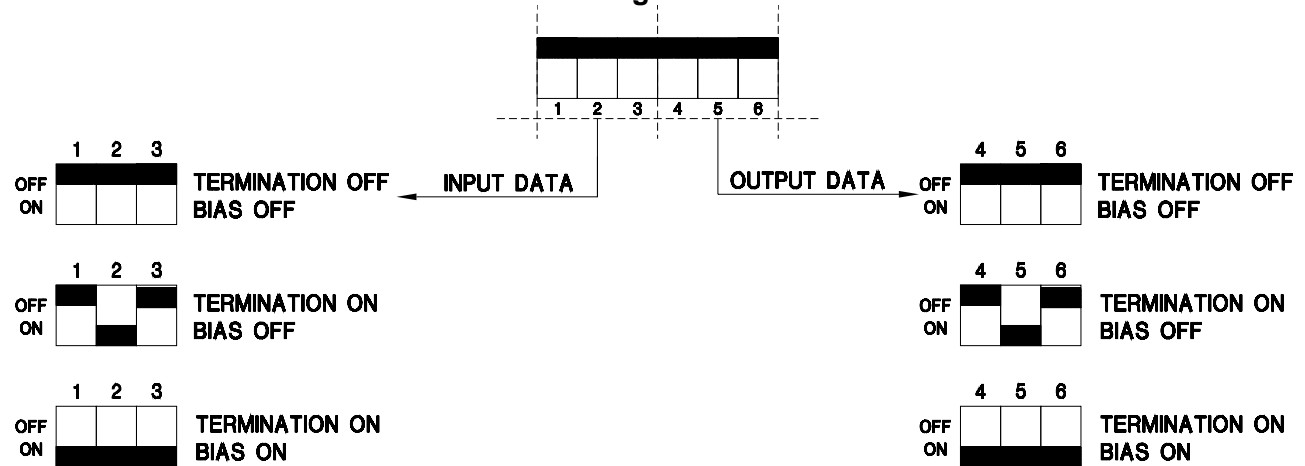
**RS422 termination switch settings:**



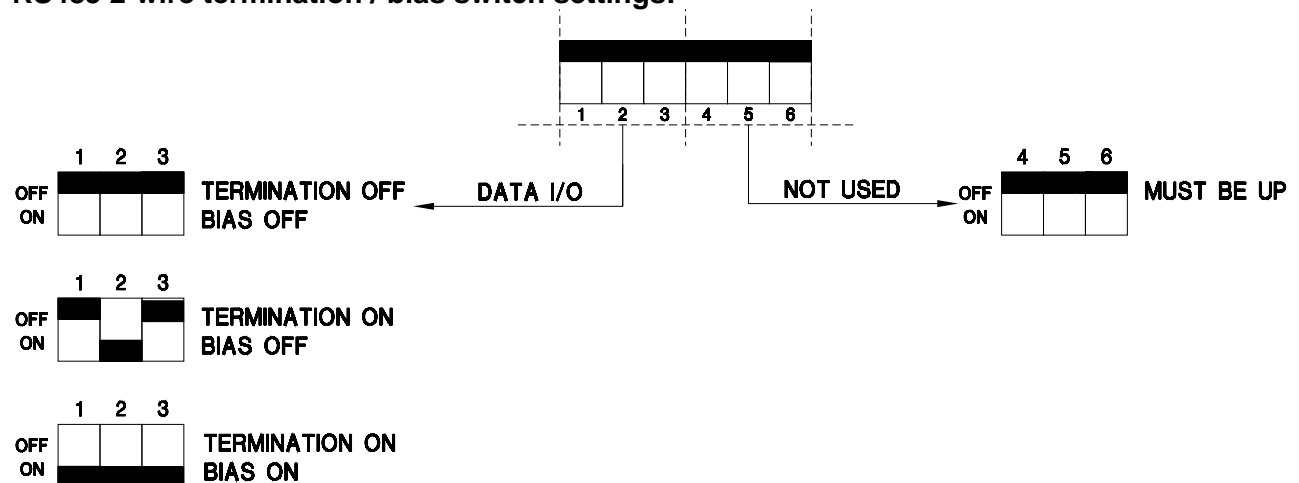


## DATA TERMINATION / BIAS (cont.)

### RS485 4-wire termination / bias switch settings:



### RS485 2-wire termination / bias switch settings:



**NOTE:** An explanation of termination and bias requirements for various data formats can be found at the end of this manual.

## MTX-CWDM-8-MPD STATUS INDICATORS

The MTX-CWDM-8-MPD provides the following front panel LED status indicators to aid in installation and troubleshooting:



### DATA RX/TX INDICATORS

DATA RX and DATA TX indicators are provided to monitor each of the two available data channels. DATA 1 RX and TX correspond with the multi-protocol output/input of DATA CH 1. DATA 2 RX and TX correspond with the multi-protocol output/input of DATA CH 2.

#### DATA RX

A green LED indicator is provided to monitor the data coming in from the fiber, through the MTX-CWDM-8-MPD, and out onto the electrical interface. The intensity of this indicator will vary with input data patterns, however in typical applications it will cycle on and off as data is received. Data received status associated with this LED is summarized below.

DATA RX LED	Data Status
Green	Data Flow Present
Off	Data Flow Not Detected

#### DATA TX

A green LED indicator is provided to monitor the data coming in from the electrical interface, through the MTX-CWDM-8-MPD, and out onto the fiber. The intensity of this indicator will vary with input data patterns, however in typical applications it will cycle on and off as data is transmitted. Data transmitted status associated with this LED is summarized below.

DATA TX LED	Data Status
Green	Data Flow Present
Off	Data Flow Not Detected

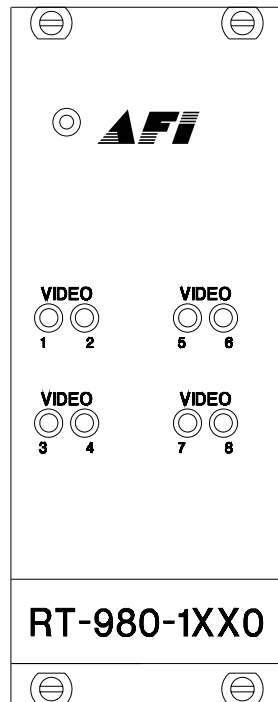
#### OLI

A dual bi-color LED indicator monitors the optical input power of the 1470nm wavelength data signal that is being received at the MTX-CWDM-8-MPD from the MRX-CWDM-8-MPD. AC power and optical input status associated with these LED indicators are summarized below. Please note that the two indicators are driven by the same source so they should both match.

Optical Level Indicators	AC Power Status	Optical Status
Green	On	Proper Optical Input Power Present
Red	On	Optical Input Not Detected
Off	Off	Check Power Supply Input

## RT-980 SERIES STATUS INDICATORS

Each of the RT-980 series transmitters provides the following front panel LED status indicators to aid in installation and troubleshooting:



### VIDEO 1 THROUGH VIDEO 8

A bi-color LED indicator is provided for each of the eight video inputs to the RT-980 series transmitters. Video status associated with each of these LED's is summarized below.

Video Presence LED	Video Status
Green	Proper Input Video Present
Red	Input Video Not Detected

## MRX-CWDM-8-MPD STATUS INDICATORS

The MRX-CWDM-8-MPD provides the following front panel LED status indicators to aid in installation and troubleshooting:



### DATA RX/TX INDICATORS

DATA RX and DATA TX indicators are provided to monitor each of the two available data channels. DATA 1 RX and TX correspond with the multi-protocol output/input of DATA CH 1. DATA 2 RX and TX correspond with the multi-protocol output/input of DATA CH 2.

#### DATA RX

A green LED indicator is provided to monitor the data coming in from the fiber, through the MRX-CWDM-8-MPD, and out onto the electrical interface. The intensity of this indicator will vary with input data patterns, however in typical applications it will cycle on and off as data is received. Data received status associated with this LED is summarized below.

DATA RX LED	Data Status
Green	Data Flow Present
Off	Data Flow Not Detected

#### DATA TX

A green LED indicator is provided to monitor the data coming in from the electrical interface, through the MRX-CWDM-8-MPD, and out onto the fiber. The intensity of this indicator will vary with input data patterns, however in typical applications it will cycle on and off as data is transmitted. Data transmitted status associated with this LED is summarized below.

DATA TX LED	Data Status
Green	Data Flow Present
Off	Data Flow Not Detected

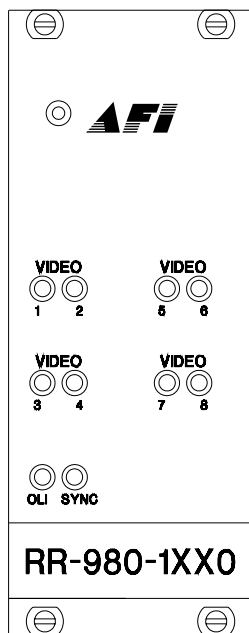
#### OLI

A dual bi-color LED indicator monitors the optical input power of the 1490nm wavelength data signal that is being received at the MRX-CWDM-8-MPD from the MTX-CWDM-8-MPD. AC power and optical input status associated with these LED indicators are summarized below. Please note that the two indicators are driven by the same source so they should both match.

Optical Level Indicators	AC Power Status	Optical Status
Green	On	Proper Optical Input Power Present
Red	On	Optical Input Not Detected
Off	Off	Check Power Supply Input

## RR-980 SERIES STATUS INDICATORS

Each of the RR-980 series receivers provides the following front panel LED status indicators to aid in installation and troubleshooting:



### VIDEO 1 THROUGH VIDEO 8

A bi-color LED indicator is provided for each of the eight video outputs from the RR-980 series receivers. Video status associated with each of these LED's is summarized below.

Video Presence LED	Video Status
Green	Proper Output Video Present
Red	Output Video Not Detected

### OLI

A bi-color LED indicator monitors the power of the optical input signal that is being received at the RR-980 series unit from video channels one through eight of its corresponding RT-980 series unit. AC power and optical input status associated with this LED are summarized below.

Optical Level Indicator	AC Power Status	Optical Status
Green	On	Proper Optical Input Power Present
Red	On	Optical Input Not Detected
Off	Off	Check Power Supply Input

### SYNC

A bi-color LED indicator is provided to monitor the proper serialization of the electrical video data stream through the RR-980 series unit. Each group of eight videos has its own SYNC indicator. Sync status associated with this LED is summarized below.

Sync LED	Sync Status
Green	Proper Data Stream Serialization Present
Red	Data Stream Serialization Not Detected

## DATA TERMINATION REQUIREMENTS

### RS232 Data Signals

The RS232 interface standard is a point to point transmission protocol for digital signals. It allows for a single transmitter device communicating to a single receiving device. This configuration is mirrored in the opposite direction to create one bi-directional data path. Devices using this protocol have terminating resistors built into their data path. This eliminates the need for any switch selection for termination resistors in the RS232 mode.

### RS422 Data Signals

The electrical interface described in RS422 is a data transmission standard for balanced digital signals. It allows for a single transmitter device communicating to as many as 32 receiving devices. This type of data signal is well suited to systems that require data to be distributed to several points without a return data path. Several companies offer camera telemetry controllers using this data interface. Because there is only one transmitting device on the network, this one may remain active at all times. There is no need for the driver to go into a high impedance state to allow others to "talk." In most cases termination resistors are not required to be applied to RS422 data outputs. In long copper runs (over 500 feet) termination resistors may be required on data inputs to eliminate data reflections.

### RS485 Data Signals

RS485 differs from RS422 in the ability of the transmitter devices to go into a high impedance (Hi-Z) state. This allows multiple transmitter devices to reside on the same wire pair. The software must dictate a protocol that allows one device to transmit at any one time to prevent data crashes. Data wiring can use two wires or four wires. Using two wires the system works in half duplex. This means that data is exchanged between two points sequentially. When a four-wire system is used, the system may be full duplex. In many cases the system head end controller will continuously poll data from all remote devices. The remote devices all respond back to the head end (one at a time!) as they are addressed. This property of the network rests solely in the hands of the software (firmware).

The driver chips used in RS485 communications are capable of changing into their high impedance state very rapidly. On even short lengths of wire there can exist a residual voltage after a driver circuit turns off. This can interfere with circuits that are used to detect the Hi-Z state. It is very important that the copper communications lines be terminated with resistors across the data wire pair. The best place to locate such resistors is at the furthest electrical devices at the ends of the wire pair. For instance, if several RS485 devices are connected in a daisy chain fashion, the wire connection would loop across all devices in a chain. The furthest two points in the chain would need to be terminated.

### OFFSET BIAS – RS485

The RS485 specification requires receivers to detect input signals down to 200mVp-p of voltage level. In many cases this can cause systems to be sensitive to noise on the data wires. In an effort to eliminate the effects of low levels of noise, some manufacturers of equipment that communicate using RS485 have introduced a small voltage bias to the data lines. This is usually accomplished using a 470 Ohm resistance to +5V on the positive line and 470 Ohm resistance to ground on the negative line. When used in conjunction with the appropriate termination resistors referred to in the previous section, this introduces about a 300 mV offset, improving noise immunity.

<p>This unit complies with 21 CFR 1040.10 and 1040.11</p>
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#### LIFETIME WARRANTY INFORMATION

American Fibertek, Inc warrants that at the time of delivery the products delivered will be free of defects in materials and workmanship. Defective products will be repaired or replaced at the exclusive option of American Fibertek. A Return Material Authorization (RMA) number is required to send the products back in case of return. All returns must be shipped prepaid. This warranty is void if the products have been tampered with. This warranty shall be construed in accordance with New Jersey law and the courts of New Jersey shall have exclusive jurisdiction over this contract. **EXCEPT FOR THE FOREGOING WARRANTY, THERE IS NO WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR OTHERWISE, EXPRESSED OR IMPLIED, WHICH EXTENDS BEYOND THE WARRANTY SET FORTH IN THIS AGREEMENT.** In any event, American Fibertek will not be responsible or liable for contingent, consequential, or incidental damages. No agreement or understanding, expressed or implied, except as set forth in this warranty, will be binding upon American Fibertek unless in writing, signed by a duly authorized officer of American Fibertek.

#### SERVICE INFORMATION

There are no user serviceable parts inside the unit.

In the event that service is required to this unit, please direct all inquiries to:

American Fibertek, Inc.  
120 Belmont Drive  
Somerset, NJ 08873

Phone: (877) 234-7200  
Phone: (732) 302-0660  
FAX (732) 302-0667

E-mail: [techinfo@americanfibertek.com](mailto:techinfo@americanfibertek.com)